Part II: Background

Part II includes an Executive Summary of the New Jersey 2000 Water Quality Inventory Report, an overview of New Jersey's water resources, water pollution control programs, costs and benefits and special state concerns and recommendations.

Chapter 1 Executive Summary

1.1. Introduction

The New Jersey 2000 Water Quality Inventory Report, commonly referred to as the 305(b) report, is the fourteenth in a series of Water Quality Inventory Reports that have been prepared by the New Jersey Department of Environmental Protection (NJDEP) since 1975. The Water Quality Inventory Report is prepared every two years, pursuant to Section 305(b) of the federal Clean Water Act (P.L. 95-217).

This New Jersey 2000 Water Quality Inventory Report was prepared using USEPA Guidelines for the Preparation of Comprehensive State Water Quality Assessments (305(b)) Reports and Electronic Updates (EPA-841-B-97-002B. Sept. 1997). This report adheres to the outline and terminology provided by USEPA Guidance to the extent possible.

Designated uses of waterbodies are specified in New Jersey's Surface Water Quality Standards (SWQS) at N.J.A.C. 7:9B-1.12 and are evaluated periodically. The designated uses in *freshwaters* are: primary and secondary contact recreation (i.e., swimmable); maintenance, migration and propagation of the natural and established biota, fish consumption (i.e., fishable/ aquatic life); industrial and agricultural water supply and public potable water supply, after conventional treatment (i.e., potable).

Designated uses in *estuarine and ocean* waters include primary and secondary contact recreation (i.e., swimmable); fish consumption, shellfish harvesting and maintenance, migration and propagation of the natural and established biota (i.e., fishable/ aquatic life).

Designated uses were established based on physical, chemical, biological, and hydrological characteristics of the waters and the economic considerations related to attaining various uses. Additional information on New Jersey's SWQS is provided in Part III-Surface Water Assessment, Chapter 3- Rivers and Streams.

Designated use assessments are performed by comparing appropriate datasets to applicable narrative and numerical criteria in the SWQS. Using *Guidance for the Preparation of Water Quality Inventory Reports provided by the Environmental Protection Agency* (USEPA, 1997), results are grouped into designated use attainment categories (i.e., full support, full support but threatened, partial support and not supporting).

This report uses the "full support but threatened" category to identify waters that currently meet designated uses, but are not expected to meet uses by the next reporting cycle (i.e., two years) due to statistically significant adverse trends. As discussed in the report, many trends indicate improving water quality. The "full support but threatened" category was also used to identify

waters for which additional data are needed to accurately characterize use support status. This approach was used because USEPA designated use support reporting requirements currently do not provide an opportunity to identify additional data needs. The applicable definition of the "full support but threatened" category is provided for each designated use support assessment.

Use of Indirect Indicators of Designated Use Attainment: In some cases, direct measurement of designated use attainment is not currently possible and one or more indirect indicators are used to estimate designated use attainment. For example, aquatic life/fishable use attainment assessments in coastal waters are currently based on water column dissolved oxygen levels and not upon direct measures of marine or estuarine biota. In the future, direct assessments of marine/estuarine biological population data will provide a more comprehensive assessment of aquatic life designated use attainment.

Spatial Extent of Assessment: For this report, the representativeness of each dataset was used to estimate the spatial extent of each assessment. For rivers and streams, the length of the stream segment which has a monitoring station was used to estimate the river miles assessed. USEPA defines stream segments in Reach File 3 as the length of stream between tributaries.

Rivers and Streams: The Ambient Stream Monitoring Network is used to collect chemical and sanitary water quality data in New Jersey's freshwater streams. Because the 79 station network as operated prior to 1997 was biased toward downstream portions of watersheds, it was not possible to extrapolate these assessments beyond the stream reach in which the monitoring station was located. Thus, 176 of 6,500 non-tidal stream miles (3%) were assessed using this monitoring program. For the next Water Quality Inventory Report, data collected under New Jersey's redesigned Ambient Stream Monitoring Network will be reported. This network design was redesigned to provide representative sampling in each of the state's 20 Watershed Management Areas and is now statistically based to allow estimations of water quality in streams that are not monitored. A higher percentage of non-tidal stream miles will be assessed using the redesigned Ambient Stream Monitoring Network.

The 820 station Ambient Biological Monitoring Network is used to collect benthic macroinvertebrate data in freshwater streams. New data collected at 139 stations, representing 330 stream miles in the northwest part of New Jersey are summarized for this report. As described above, USEPA's Reach File 3 (RF3) was used to determine the spatial extent of this assessment.

Lakes: Assessments were applied to the entire lake that was monitored.

Estuaries and Oceans: The Coastal and Estuarine Monitoring Program, Shellfish Sanitation Program and Cooperative Coastal Monitoring Program are representative of estuaries, oceans, beaches and shellfish beds. Thus, 100% of these waterbodies were assessed.

Designated use attainment status was reported by assessed river miles, lake acres, and square miles of ocean and estuary attaining each use. The designated use attainment results summarized below are also provided in tables in Appendix I to this Executive Summary.

Management Strategies: Management strategies that are being implemented or planned are identified to address data assessment needs and to maintain and improve designated use attainment.

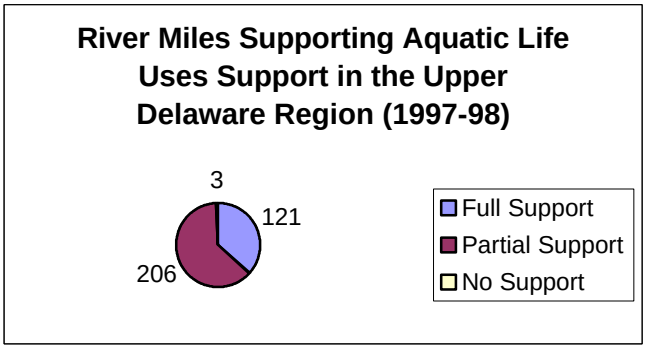
1.2 Designated Use Support By Waterbody Type

Designated use support summary tables are provided in Appendix A1.2-1. A map of New Jersey's 20 Watershed Management Areas is provided in Part II- Chapter 2: New Jersey's Water Resources, Figure II-1.

Rivers and Streams

There are 6,500 miles of non-tidal rivers and stream in New Jersey. Aquatic life designated use was assessed in 330 stream miles in northwestern New Jersey, within Watershed Management Areas (WMA's) 1, 2, 11. Published results are available for these WMA's which were sampled in 1997 and 1998. (NJDEP, 1999).

Aquatic Life Designated Uses in Rivers: Benthic macroinvertebrate data collected in 1997 and 1998 in WMA's 1, 2 and 11 through the AMNET program were used to identify stream reaches which were not impaired (fully supporting); partially supporting (moderately impaired) and severely impaired (not supporting). Results indicate that aquatic life designated uses were fully supported in 121 miles (37% of assessed stream miles), partially supported in 206 miles (62.4% of assessed stream miles) and not supported in 3 miles (1% of assessed stream miles). A review of fish population data from the 1970's and 1990's showed significant improvement in fish populations in the Delaware, Raritan and Passaic River Basins. Integration of fisheries data into future aquatic life designated use assessments will provide a more comprehensive assessment of aquatic life status. Over the past several years New Jersey has adopted upgrades to the Trout Water Classification of 16 river segments to Trout Production or Trout Maintenance status.

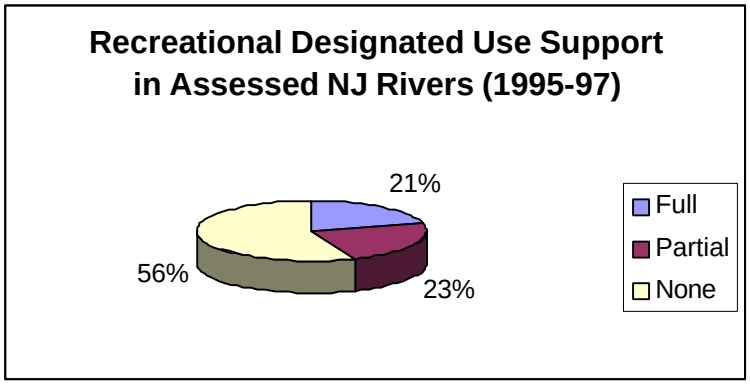


Maintaining and Improving Aquatic Life Uses in Rivers: Major strategies to maintain and improve aquatic life designated use attainment include:

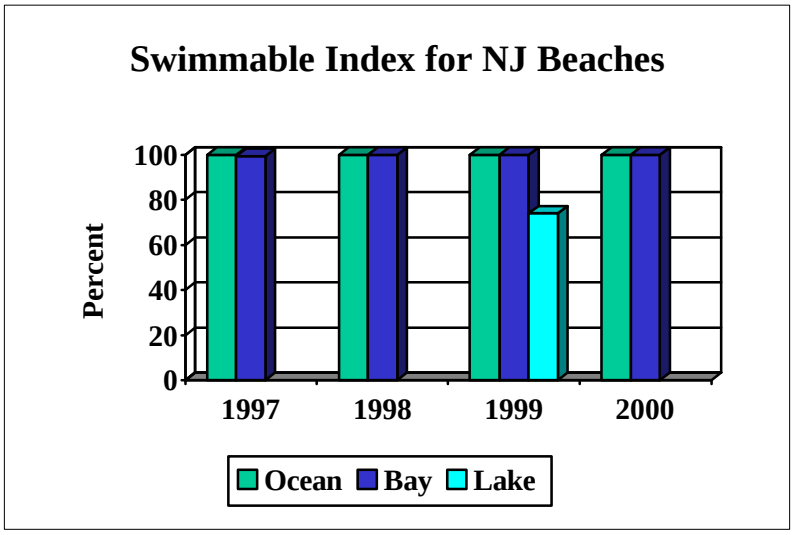
- Development of TMDLs as appropriate where water quality degradation significantly contributes to aquatic life use impairment
- Integration of various biological datasets and development of a "fishable index" to improve the technical basis for aquatic life designated use assessments
- Identification of factors that contribute to benthic impairment through research studies, field assessments, evaluations of locations where impairment ratings changed over time

- Targeting nonpoint source management projects and in the future, implementation of the watershed management rules and implementation of the municipal stormwater planning management programs.

Recreational Designated Uses in Rivers: Recreational designated use (i.e., swimming) was assessed in 176 stream miles statewide by comparing fecal coliform data collected between 1995 and 1997 in the Ambient Stream Monitoring Network to NJSWQS. Results indicate that recreational uses were fully met in 30 miles (22% of assessed stream miles), partially met in 28 stream miles (23% of assessed stream miles) and not met in 118 stream miles (56% of assessed stream miles). As discussed previously, the monitoring design used to collect these data does not support extrapolating results to streams that are not monitored. However, streams that appeared to have the greatest impact were prioritized.



New Jersey's recreational lake, ocean and bay bathing beaches, where the vast majority of swimming takes place, are thoroughly monitored and generally very safe for swimming. Recreational bathing beach assessments for lakes are summarized below; assessments for ocean and bay beaches are provided in Part III, Chapter 5 of this report.



It is important to note that stream monitoring stations were not located at places in rivers where swimming occurs. Thus, this assessment is not an appropriate measure of potential human health risk from swimming in New Jersey rivers. Through Watershed Management, swimming and canoeing areas in rivers and streams will be identified and targeted monitoring will be explored. In addition, New Jersey's rivers are affected primarily by nonpoint sources of pollution such as geese, storm drains and overland runoff. Compliance with sanitary effluent requirements at wastewater treatment plants is very high.

Improving Sanitary Quality in Rivers: Major strategies include:

- Targeting collection of data to river locations where swimming or boating occurs to evaluate human health risk.
- TMDL development and implementation based on the schedule in the TMDL Memorandum Of Agreement between USEPA Region II and NJDEP.
- Source identification, including evaluations of sanitary storm sewers, failing and inappropriately placed septic systems, livestock, wildlife and pets.
- Management of sources through municipal stormwater management and permitting, BMP implementation, pet waste ordinances, septic system management on a watershed specific basis. Projects can be funded through the Nonpoint Source Management (319h) grants and New Jersey Environmental Infrastructure Trust, among other sources.

Drinking Water Designated Use in Rivers: Drinking water designated use was systematically assessed for the first time in this report. This designated use assessment indicates whether surface waters are of adequate quality to be used as drinking water supplies. Finished drinking water is of very high quality: in 1998, 97% of systems met all microbiological standards and 93% met all chemical standards. Levels of nitrate in finished drinking water remain consistently below the Maximum Contaminant Level allowed under the Drinking Water Quality Standards, however, rising levels of nitrate were identified as an emerging issue for some surface water supplies, particularly under record low stream flow conditions that were experienced during the summer of 1999. In the Passaic Basin, several wastewater treatment plants reduced levels of nitrate in effluent during the drought of 1999 to successfully protect water supplies during this critical period.

Maintaining and Improving Drinking Water Designated Use in Rivers

- Additional information regarding quality of drinking water sources will be compiled and assessed through the Source Water Assessment Program.

- The pilot project to reduce nitrate concentrations in effluent in the Passaic Basin is continuing during the summer of 2000.

Agricultural Supply Designated Use in Rivers: Agricultural designated use was assessed for the first time in this report. This designated use assessment indicates whether surface waters are of adequate quality to be used for irrigation and livestock. Data from the Ambient Stream Monitoring Network collected between 1995 and 1997 were compared to standards based on the Soil Conservation Service guidelines. Of 176 miles assessed, 100% met the guidelines, indicating that agricultural designated use was fully met. Programs focusing on maintaining or improving water quality in agricultural areas include the $1.3 million best management practices (BMP) program initiated in 1998 to minimize impacts to water quality by agriculture throughout the state.

Industrial Supply Designated Use in Rivers: Industrial designated use was assessed for the first time in this report. This pilot designated use assessment was based on attainment of NJSWQS for pH and total suspended solids (TSS). These constituents were selected to indicate whether

surface waters are of adequate quality to be used for industrial purposes. However, additional input from industrial water users is needed to further evaluate this assessment method.

The preliminary assessment was based on pH and TSS data from the Ambient Stream Monitoring Network collected between 1995 and 1997. Of 176 miles assessed, 114 stream miles (65% of assessed stream miles) fully meet industrial uses, and 64 stream miles (35% of assessed stream miles) partially meet industrial designated uses.

Maintaining and Improving Industrial Supply Designated Use in Rivers: Major strategies include:

- Development and implementation of TMDLs for locations with exceedences of SWQS criteria for pH
- Clarify needed water quality by industrial users.

Fish Consumption Designated Use in Rivers: Fish consumption designated use was assessed using existing consumption advisories in New Jersey waters. Any current advisory to reduce or eliminate the consumption of one or more species was included. The spatial extent of fish advisories was estimated for the first time in this report. Of 124 stream miles assessed, 30 miles (24% of assessed stream miles) fully support fish consumption but uses are considered to be threatened. This USEPA classification was employed for any waters where the advisory is more than 10 years old and where preliminary data indicate that contaminant levels may be decreasing, warranting re-evaluation of the advisories. There were 94 stream miles (76% of assessed stream miles) that partially support fish consumption designated uses due to advisories to limit consumption of 2 species, largemouth bass and chain pickerel, due to mercury contamination.

Maintaining and Improving Fish Consumption Designated Use in Rivers: Major strategies include:

- Improve the basis for fish consumption advisories through assessment of new data and amendments to advisories as needed.
- Development of a fishable index that considers fish populations and consumption issues
- Continue to monitor for sources especially air deposition of toxics
- Develop a stable source of funding for routine monitoring of fish tissue

Lakes

There are 3,600 lakes larger than 2 acres, including 380 public lakes in New Jersey covering 72,590 acres and 24,000 public lake acres. Aquatic life use support was assessed for the first time using fisheries data collected at public and private lakes by the NJDEP's Bureau of Freshwater Fisheries. Of 9,875 lake acres assessed, 5,950 acres (60% of assessed lake acres) fully support aquatic life uses. Another 2,635 acres (27%) fully support but are threatened. The remaining 1,290 acres (13% of assessed lake acres) partially meet aquatic life uses.

Maintaining and Improving Aquatic Life Designated Uses In Lakes: Major strategies include:

- Developing more direct measures of aquatic life designated uses in lakes by expanding use of fisheries data and developing benthic macroinvertebrate protocols for lakes
- Implementing warmwater fisheries management strategies in lakes

Recreational Designated Uses: Primary contact recreation at New Jersey's 376 recreational lake bathing beaches was assessed for the first time in this report. Data collected by county health departments and local lake managers at public and private lakes were compiled and compared to New Jersey Department of Health and Senior Services Standards for primary contact. Of 376 lake beaches, 277 (74%) fully support recreational designated uses, 50 lakes (13%) partially support recreational designated uses, 27 lakes (7%) do not support recreational designated uses and 22 lakes (6%) could not be assessed due to lack of data. To date, 167 of 376 lake beaches have now been located on NJDEP's GIS system. GPS locations for the remaining lakes are being collected and will be included in a future report.

Based on available lake trophic status data, many New Jersey lakes are threatened by eutrophication. Eutrophication is a natural process: lakes fill in with sediment and become wetlands. Eutrophic lakes are characterized by significant growth of aquatic plants and can experience depleted dissolved oxygen. Eutrophication is accelerated in many of New Jersey's lakes because they are shallow man-made impoundments, which are highly prone to accelerated inputs of nutrients and sediment. Aquatic life may at times be negatively affected by depleted dissolved oxygen and temperature fluctuations that can occur in eutrophic lakes and the abundant algae and/or macrophytes can impair swimming and boating.

Through the development of Total Maximum Daily Loads for eutrophic lakes, the sources of nutrient and sediment inputs will be characterized. Nonpoint sources of nutrients and sediment include erosion, runoff and stormwater. Point sources above impoundments may contribute nutrients to lakes.

Maintaining and Improving Recreational Designated Uses in Lakes: Major strategies include:

- Improving the spatial assessment by locating remaining lakes on GIS
- Continuing and expanding cooperative assessments and data exchange with Department of Health and Senior Services
- Improve the lake beach component of the "Swimmable Index" to include beach closures at all New Jersey lake beaches
- Identifying and prioritizing improvement projects at lakes with recreational use impairments
- Developing TMDLs for impaired lakes
- Implementing TMDLs and improvement projects in impaired lakes

Fish Consumption Designated Use in Lakes: Fish consumption designated use was assessed if an advisory to reduce or eliminate consumption of one or more species was in effect. The spatial extent of fish advisories was estimated for the first time in this report. Of 14,357 lake acres assessed, 14,131 acres (98% of assessed lake acres) partially support fish consumption designated use due to advisories to limit consumption of 2 species, largemouth bass and chain pickerel. These advisories are based on data that are less than 10 years old. The remaining 114 acres (2% of assessed lakes) were classified as threatened; advisories on these Camden area lakes are based on chlordane data more than 10 years old.

Maintaining and Improving Fish Consumption Designated Use in Lakes: See major strategies for Rivers.

Coastal Waters

There are 725 square statute miles (1 statute mile = 5,280 feet) of estuary and 446 square statute miles of ocean within New Jersey jurisdiction. Assessments of estuarine waters are conducted by NJDEP, the Delaware River Basin Commission (DRBC) and Interstate Environmental Commission (IEC). DRBC assesses the Delaware River and estuary; IEC assesses the New York-New Jersey Harbor in their Water Quality Inventory Reports. Estuary assessments in this report focused on the 269 square statute miles that are not part of interstate waterbodies. Ocean assessments in this report include all 446 square statute miles of ocean within New Jersey jurisdiction.

Aquatic Life Uses in Coastal Waters: Aquatic life designated uses in New Jersey estuaries and ocean waters were assessed for the first time in this report. The assessment relied on dissolved oxygen data collected by NJDEP (estuaries) and USEPA (ocean). Of 710 square statute miles of ocean and estuary assessed, 649 (92%) fully support the use while the remaining 61 square statute miles (8%) partially supported aquatic life. Within this subcategory of 649 square miles fully supporting, 297 square miles (42% of total assessed area) fully supported aquatic life while 352 square statute miles (50%) fully supported the use but are threatened The data used for this assessment were collected during the summers of 1997 and 1998. USEPA's classification of threatened was employed because additional data are needed to characterize aquatic life use support in these waters.

During the summer, DO naturally declines as waters warm; these natural conditions may be extended by inputs of nutrients from coastal lands. These low DO conditions do not occur during other times of the year as waters are cooler and storms contribute to a well mixed water column. As discussed previously, DO is an indirect indicator of aquatic life uses; fish and shellfish are generally tolerant of some low DO conditions. Additional data are needed to more directly characterize effects on aquatic life. Thus, waters where DO did not meet SWQS for portions of the summer were classified as "threatened". As additional data and assessments are completed, aquatic life designated use assessments for coastal waters will be refined.

Maintaining and Improving Aquatic Life Designated Use in Coastal Waters: Major strategies include:

- Improve the scientific basis for aquatic life use assessments in coastal waters through integration of fisheries population data, ocean discharger biological monitoring and other biological datasets
- Develop a "fishable index" that considers fish population and consumption issues
- Continue to monitor and assess air deposition of nutrients to coastal waters
- Manage nutrient loads to coastal waters through available programs and TMDL development (e.g., New York-New Jersey Harbor nutrient TMDL)

Recreational Uses in Coastal Waters: Recreational designated uses in New Jersey estuaries and ocean waters were assessed using fecal coliform data collected in estuaries by NJDEP's Coastal and Estuarine Water Quality Monitoring Program, and in the ocean by NJDEP's and USEPA's Helicopter Monitoring Program. The NJDEP's aerial surveillance consisting of six flights per week, provides for routine evaluation of coastal water quality and the assessment of the nature

and extent of ocean pollution in Raritan Bay, the Lower New York Bay, and the Atlantic coast from Sandy Hook to Cape May Point.

The spatial extent of this assessment is provided for the first time in this report. Bathing beaches represent a very small portion of estuarine and ocean waters but they are summarized using data from the Cooperative Coastal Monitoring Program because of the broad interest in recreational bathing beaches. Bathing beach data are also most relevant to potential human health risks from swimming. Of 715 square statute miles of ocean and estuary assessed, 710 (99.3%) fully supported recreational designated uses and 5 square miles (0.7%) partially supports recreational designated uses.

Maintaining and Improving Recreational Use in Coastal Waters: Major strategies include:

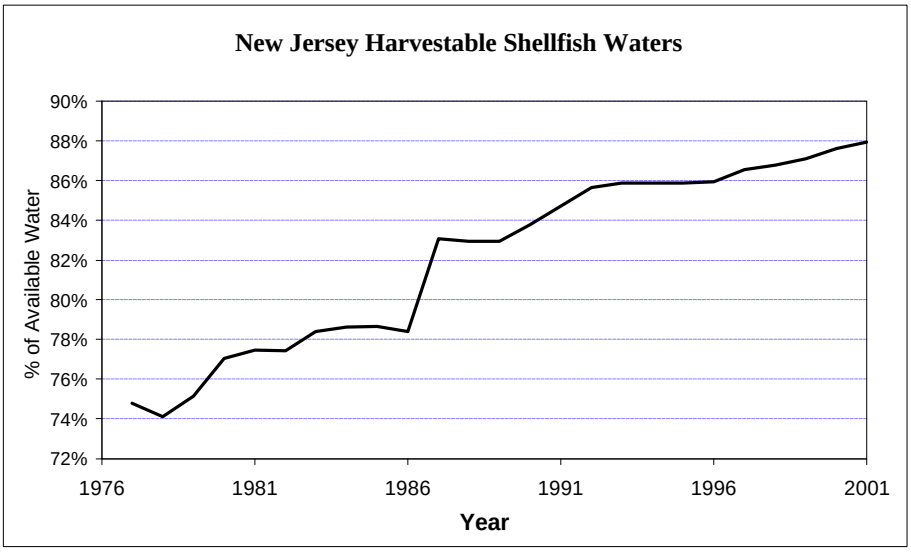
- Implement NJDEP's Beach Action Plan
- Expand inspections of coastal wastewater facilities to include sewage collection systems
- Through development and implementation of TMDLs and the municipal stormwater planning and permitting program, manage sources of FC from freshwater systems and coastal stormwater systems

Fish Consumption Use in Coastal Waters: Fish consumption designated use was assessed for waters affected by fish consumption advisories or bans for one or more species. The spatial extent of this assessment is provided for the first time in this report. The assessment was limited to 215 square statute miles of ocean waters because fish consumption designated uses are assessed in interstate waters by DRBC and ISC. Of 215 square miles assessed, 100% fully meet fish consumption designated uses but were threatened because of consumption advisories and bans. This assessment is based on fish advisories for chlorinated organics that are more than 10 years old. Because preliminary data indicate that contaminant levels may be decreasing, warranting re-evaluation of the advisories, these waters were classified as threatened. It is important to consider that fish are mobile animals and may have become contaminated in New Jersey's waters or elsewhere. Clearly, new data are needed to evaluate fish tissue contamination and adjust advisories as needed.

Maintaining and Improving Fish Consumption Designated Use in Coastal Waters: See major strategies for rivers

Shellfish Consumption Designated Use in Coastal Waters: Shellfish consumption designated uses were assessed using total coliform data collected in the National Shellfish Sanitation Program. These data are used to classify waters for shellfish harvest as unrestricted harvest (fully supporting), special restricted or seasonal harvest (partially supporting) and closed (not supporting). Of 1,053 square miles assessed, 808 square miles (77%) fully support shellfish consumption designated uses, 115 square miles (10.9%) are classified for seasonal or special restricted harvest and thus partially support shellfish consumption designated uses and 130 square miles (12.3%) do not support shellfish consumption. Note that 923 square miles (87.7%) available for unrestricted, special restricted or seasonal harvest are considered "harvestable waters" by the National Shellfish Sanitation Program because harvesting is allowed under specific conditions, such as seasonally or after relay or depuration processes. The shellfish

waters that support harvesting have increased from 75% in 1977 to 86% in 1996, to 87% in 1998 and 88% in 2000.



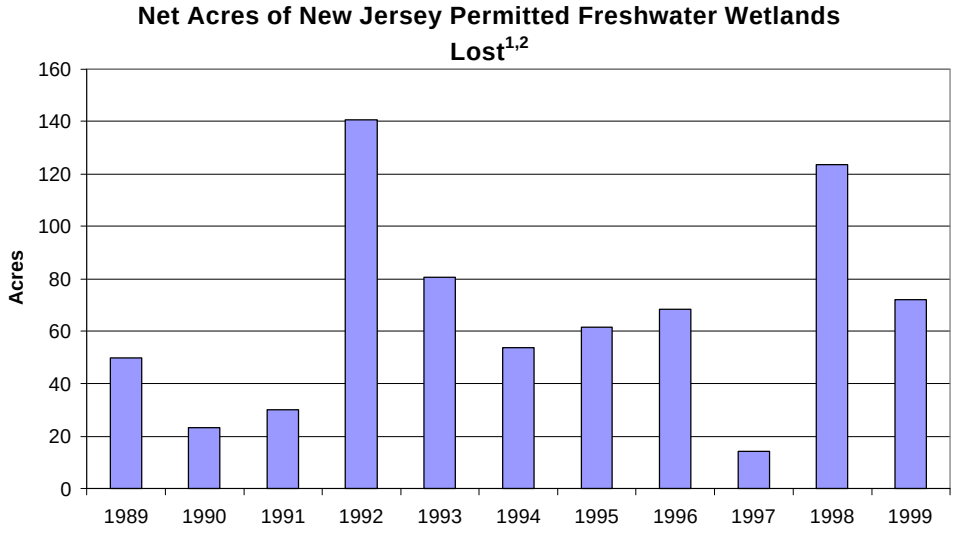
Maintaining and Improving Shellfish Consumption Designated Use in Coastal Waters: Major strategies include:

- Implement the shellfish action plan to attain 90% harvestable by 2005
- Address sources of coliform bacteria to Seaside Heights shellfish harvesting areas
- Continue to implement the nonpoint source monitoring strategy as appropriate in additional locations.

1.3 Wetlands Resources

New Jersey has an estimated 948,429 acres of wetlands or approximately 19% of New Jersey's land base: 739,160 acres are freshwater wetlands and 209,269 acres are tidal wetlands. Following the stressor-condition-response model of indicators established in NJDEP's Performance Partnership Agreement with USEPA, the 305B Report, for the first time, has included both stressor and condition indicators for wetlands, as well as descriptive response measures. Permitted wetlands losses in relation to required mitigation acreage, show that from July 1, 1988 through June 30, 1999 there was an estimated permitted net loss of 718 acres of freshwater wetlands. From 1992 through 1998, there was an estimated permitted disturbance to 204.18 acres of New Jersey coastal wetlands with 17.5 acres of compensatory mitigation through wetlands creation and enhancement of 8,849 acres of coastal wetlands through ongoing enhancement and restoration projects. Permitted wetland disturbances are indirect measures of wetlands loss, as all permitted activities would need to be field verified to ascertain if they occurred. In some limited cases, permitted activities are temporary disturbances with no net loss of wetlands. For example, General Permit #2 allows for installation of underground utility lines, but requires the disturbed area to be restored once construction is complete. Therefore, these sorts of activities are not losses, but permitted disturbances.

Maintaining and Improving Wetlands Resources: In addition to the stressor and condition indicator data for wetlands, NJDEP recognizes the need to track wetland acreage (conditions) and wetlands conversion (stressor) over time. Therefore, NJDEP included DRAFT data for 12/20 New Jersey Watersheds (data for the entire State were not available) to show the change in wetlands acreage based upon aerial photography for two time periods, 1986 and 1995, by Anderson level classification. NJDEP has publicly released these data, via the Internet, to assist in scientific analyses and environmental planning efforts by governmental and non-governmental organizations.



Notes
1 Acres lost equals sum of acres disturbed pursuant to both individual and general permits minus acreage of compensatory mitigation required
2 Data include repeat disturbances/impacts for certain activities and/or temporary disturbances which do not necessarily constitute new or additional wetlands losses.

In addition to establishing new data on wetland resources for New Jersey, NJDEP is currently conducting over a dozen studies in concert with university scientists and wetlands professionals to map and monitor New Jersey wetlands, as well as develop methods to assess wetlands quality and function.

Wetlands protection activities include preservation, compensatory mitigation, and one of the strictest regulatory programs in the United States. Wetlands open space acquisition and tax exemption programs have been further secured through the Garden State Preservation Trust Act of 1999 dedicating $98 million of annual funds over ten years and $1 billion in bond financing to support open space preservation. NJDEP and the New Jersey Department of Agriculture are anticipating a cooperative Conservation Resource Enhancement Program (CREP) with the federal government to purchase easements or rental contracts on up to 30,000 acres of riparian

buffers of agricultural land (including wetlands). Newly proposed NJDEP freshwater wetlands rules include vernal pool protection and additional buffers adjacent to wetlands transitional areas. In addition, newly proposed NJDEP watershed rules provide increase protection for wetlands as environmentally sensitive areas, through stormwater nonpoint source requirements, and maintenance of base flows to streams.

1.4 Status and Trends in Water Quality

Rivers and Streams

The status of rivers and streams water quality was characterized by comparing 1995 to 1997 data collected from 79 stations sampled in the Ambient Stream Monitoring Network (ASMN) to applicable SWQS criteria. See Part III, Chapter 3.1 for a description of New Jersey's SWQS.

USEPA Guidance for the Preparation of Water Quality Inventory Reports recommends that SWQS for non-toxic parameters are met if 0-10% of samples from a monitoring location exceed applicable criteria; SWQS are partially met if 11-25% of samples from a monitoring location exceed applicable criteria and SWQS are not met if more than 25% of samples from a monitoring location exceed applicable criteria.

The ASMN was redesigned beginning in October 1997. Sufficient data for comparison to SWQS will be available from the redesigned ASMN for the 2002 Water Quality Inventory Report. Trends between 1986 and 1995 were assessed by the United States Geological Survey (USGS) under contract to NJDEP. (USGS, 1999).

Of 1,259 **dissolved oxygen** (DO) measurements collected at 76 stations in the Ambient Stream Monitoring Network between 1995 and 1997, 98.8% of samples met applicable SWQS criteria. The average DO for all monitoring stations was 9.8 parts per million. Thus, 173 of 176 monitored stream miles (98.3%) met applicable DO criteria.

Of 1,265 **total phosphorus** (TP) measurements collected between 1995 and 1997 in the Ambient Stream Monitoring Network, applicable SWQS criteria for TP were met at 29 of 79 stations, representing 67 assessed stream miles and 858 (68% of samples) met applicable SWQS criteria. Of 79 stations, 40 (50% of stations) had statistically significant decreasing trends (i.e., improving water quality) between 1985 and 1995; a statistically significant increasing trend was found at only 1 station. Through TMDL planning and development, additional data collection and assessments will be conducted to evaluate whether excessive primary production is occurring at or downstream of monitoring stations with elevated TP.

Of 1,183 **un-ionized ammonia** measurements collected at 76 stations in the Ambient Stream Monitoring Network between 1995 and 1997, only 1 exceedance of applicable SWQS criteria was found. Thus, 100% of 176 monitored stream miles met un-ionized ammonia criteria.

Of 1,216 **pH** measurements collected between 1995 and 1997 in the Ambient Stream Monitoring Network, 1013 (83.3% of samples) met applicable SWQS. Based on these data, pH criteria were met at 54 of 76 stations (71%) representing 114 of 176 monitored stream miles (65%). It is important to note that naturally low pH occurred in some streams outside the Pinelands area,

reducing overall compliance with pH criteria. Additional pH characterizations will be conducted in these areas as TMDLs are planned and developed. These results can be used as appropriate to evaluate SWQS criteria for pH.

Of 1,254 **nitrate** samples collected between 1995 and 1997 in the Ambient Stream Monitoring Network, 1,252 (99.9%) met applicable SWQS criteria, and only 1 exceeded the Drinking Water Maximum Contaminant Level of 10 ppm. However, nitrate in surface water was identified as an emerging issue. Rising trends (i.e., declining water quality) were found at 24 locations and 9 of 81 stations (11% of stations) had maximum nitrate concentrations over 5 ppm. This concentration was chosen to evaluate nitrate in streams because drinking water purveyors are required to monitor quarterly if finished drinking water exceeds 5 ppm (half of the 10 ppm Maximum Contaminant Level).

Table II-1.1: Water Quality Status Summary (1995-1997) in 176 Stream Miles Assessed

Parameter	SWQS Fully Met	SWQS Fully Met but Threatened (1)	SWQS Partially Met	SWQS Not Met
Dissolved Oxygen	173	0	3	0
Total Phosphorus	67	0	25	84
Un-ionized Ammonia	176	0	0	0
pH	114	0	34	28
Nitrate	176	0	0	0

1. Assessed waterbodies were evaluated for trends that would indicate that SWQS would not be met within 2 years as per USEPA's definition of "Threatened". Many water quality trends were improving. Where adverse water quality trends were found, none were strong enough to indicate that SWQS would not be met within 2 years.

The second round of biological sampling was completed in the Upper Delaware Water Region (WMA's 1, 2 and 11), allowing trends to be reported. See Figure II-1. Between the first sampling in 1993 and the second round in 1998, 71% of stations did not change impairment rating, while 13% improved and 16% declined.

Other Waterbodies

Additional data collection and assessments are needed to support evaluation of trends in remaining waterbodies.

1.5 Causes and Sources of Impairment

A qualitative assessment of causes and sources of impairment is provided in this report. In the future, as additional assessments are completed, these assessments will become more rigorous and more quantitative. It is expected that through development and implementation of Total Maximum Daily Loads (TMDLs), causes and sources of impairment will be better characterized in terms of severity and spatial extent to inform management priorities that can be implemented through Watershed Management Plans, ongoing programs and partnerships with the regulated community and local citizens and groups.

Rivers and Streams

Through studies and assessments, aquatic life (i.e., benthic) impairments have been generally attributed to water quality, sediment quality, habitat alterations (e.g., erosion, sedimentation), flow alterations (e.g., flashiness, low or high flows, drought) and natural population shifts. As the second round of data are collected, additional habitat evaluations are becoming available. Projects are being planned in the Whippany Watershed (in WMA06) and statewide to identify specific causative factors and sources of the problems.

Recreational designated use impairments are caused by elevated levels of fecal coliform. As discussed earlier, these river data are not appropriate for assessing risks to human health from swimming, and further, New Jersey bathing beaches are thoroughly monitored and very safe for swimming. Fecal pollution is primarily due to nonpoint sources, such as geese, storm drains and overland runoff; compliance at wastewater treatment plants is very high. Localized issues arise due to combined sewer overflows, failing wastewater and septic infrastructure and occasional wastewater treatment plant malfunctions. The role of livestock is also being explored.

Fish consumption designated use impairments in rivers and streams are caused primarily by mercury contamination. Mercury comes from air sources and historical pollution, including application of mercury based pesticides.

Lakes

Most of New Jersey lakes are in-stream impoundments that are highly prone to eutrophication. Historical Clean Lakes Program data show that many of New Jersey's public lakes are threatened by eutrophication, which is caused by excess nutrients and sedimentation. These conditions can lead to blooms of algae and aquatic weeds, which can cause low dissolved oxygen as they decay impairing biota, and can also degrade the recreational value of a lake for swimming and boating.

The natural transformation of lakes to wetlands is being accelerated by point and nonpoint source contributions of nutrients and erosion caused by stormwater. Erosion transports nutrients and suspended sediments to lakes, where they accumulate along with decaying plant materials, eventually filling in these waterbodies. The significance of these loads relative to in-stream concentrations and loads will be evaluated as TMDLs are developed.

Estuaries and Oceans

Nutrient inputs from rivers and streams, point and nonpoint sources including air deposition and natural actions of currents can contribute to algal blooms and depressed dissolved oxygen in estuaries and the ocean.

NJDEP recognizes that multi-media approaches to environmental assessment and management are best when dealing with contaminants that may be transported through differing media. Understanding the effects of air deposition and other non-point sources of pollution to coastal waters, including contaminant composition and magnitude of potential load, is critical to scientists and policy makers in formulating watershed-based management strategies and regional solutions to environmental issues.

NJDEP has established the statewide New Jersey Atmospheric Deposition Network (NJADN) which samples gaseous, particulate, and precipitation concentrations of a number of contaminants at nine sites throughout the State. The NJADN, through the collection of data that address wet and dry deposition and air-water exchange of atmospheric pollutants, will provide estimates of direct loadings to surface waters. Such data will be especially important for aquatic systems that have large surface areas relative to watershed areas, such as coastal areas. Preliminary findings of the NJADN are available for a number of pollutants. A study of Barnegat Bay indicated that over 75% of the nitrogen input to the bay is from atmospheric deposition.

In addition, historical inputs of toxics and current releases from contaminated sites and wastewater treatment plants contribute contaminants to sediments. Through the process of bioaccumulation, some of these contaminants can accumulate in the food chain and concentrate at levels of concern for human consumption. Fish are mobile animals, and the contamination may have occurred in New Jersey's waters or elsewhere.

1.6 Programs to Correct Impairments

The NJDEP Strategic Plan and NEPPS Agreement provide over-arching umbrellas to assess and prioritize environmental problems, to align program strategies to protect waters that currently meet designated uses and to improve impaired waters. Major strategies include adopting and implementing Water Quality and Watershed Management Rules, developing and adopting revisions to NJSWQS, enhancing monitoring and assessment programs, and development of TMDLs for impaired waterbodies. Additional information is provided in Part II-Background, Chapter 3- Water Pollution Control Programs.

1.7 Plan for Comprehensive Coverage

Rivers and Streams: Implementation of the Redesigned Ambient Stream Monitoring Network began in October 1997. A project is underway to estimate the spatial extent covered by this network. Data assessments, including spatial extent will be available for the 2002 Water Quality Inventory Report.

An assessment by the United States Geological Survey (USGS) indicates that benthic macroinvertebrate monitoring in the 820 station AMNET program is representative of New Jersey streams. Thus, aquatic life designated use attainment is comprehensively assessed in this program.

Lakes: Trophic status of New Jersey lakes has been comprehensively assessed through the Clean Lakes Program. Additional data and assessments are needed to identify use impairments in these lakes. Data from Fish and Wildlife's Warmwater Fisheries Programs provide a comprehensive assessment of fisheries resources in lakes.

Estuaries and Oceans: New Jersey coastal waterbodies have been comprehensively assessed through the Marine and Estuarine Water Quality Monitoring, National Shellfish Sanitation Program, Cooperative Coastal Monitoring Program and USEPA's Helicopter Program.

Toxics in Fish Tissue: Additional data collection and assessment are needed to evaluate waters that have not been monitored and to update advisories that are more than 10 years old.

NJDEP is participating in USEPA's national workgroup to develop a Comprehensive Assessment and Listing Methodology (CALM). This workgroup is charged with developing an integrated approach to assessing designated use attainment for Water Quality Inventory Reports (305b) and listing impaired waterbodies for Impaired Waterbodies Lists (303d). Results of this workgroup will be used to inform assessment and listing procedures, including the spatial extent of assessments.

1.8. Summary of Special State Concerns and Recommendations

Special state concerns and recommendations were grouped by designated use impairment. Recommendations include strategies that can be implemented by New Jersey, as well as at the regional and national levels.

Concern: Aquatic Life Designated Use Impairment

Published results show about 500 of 800 sites (65% of monitoring stations) are impaired and preliminary data indicate that there may a trend toward moderate impairment over time. Some locations that were severely impaired in the early 1990's were moderately impaired in the late 1990's and some that were not impaired in the early 1990's were moderately impaired in the late 1990's. Preliminary information indicates that impairments may be related to natural and human-induced physical habitat disturbances.

Recommendations:

- Continue implementation of ongoing water pollution control programs
- Protect and improve stream corridors through Conservation Resource Program (CRP) and preservation of open space
- Implement Stormwater Planning and Management at the municipal level
- Collect site specific data and conduct additional evaluations to assess causes of impairment; target program implementation as appropriate, utilize Nonpoint Source Management (319h) funds to address nonpoint sources that contribute to impairment.
- Improve aquatic life assessments by integrating fisheries and other databases

Concern: Fish Consumption Designated Use Impairment

Advisories, and for some locations and species, consumption bans are in place due to historical pollution, air deposition and ongoing releases from contaminated sites. Advisories for chlorinated organics are based on data that are more than 10 years old and may not reflect current conditions.

Recommendations:

- Continue to implement, and improve as needed, point source controls on mercury and PCBs
- Develop and implement source reduction strategies, including source trackdown projects
- Manage contaminated sediments through dredging, capping
- Evaluate and manage as appropriate the contributions from air

- Implement routine fish tissue monitoring to evaluate older advisories, evaluate toxics in shellfish
- Improve and expand advisory outreach and education

Concern: Maintain and Improve Recreational Designated Use Attainment at Beaches; Improve Sanitary Quality in Rivers

Ocean, bay and lake beaches routinely meet designated uses, but occasional closures occur, typically related to storm events. Recreational designated uses in monitored rivers are generally not met, although river monitoring is not targeted to locations used for swimming and boating.

Recommendations

- Ensure continued compliance at wastewater treatment plants and address wastewater and stormwater infrastructure problems near beaches
- Continue to implement Clean Shores Program and the Beach Closing Action Plan
- Target river monitoring to locations where swimming and boating is likely
- Work with USEPA to evaluate pathogen indicators

Concern: Shellfish Harvest Designated Use Attainment

New Jersey is a national leader in opening shellfish beds, but nonpoint pollution sources threaten near coastal shellfish waters.

Recommendations:

- Implement the Shellfish Action Plan which targets specific harvest areas
- Continue to implement statewide point source management programs
- Proactively manage stormwater from shore municipalities and marinas
- Evaluate toxics in shellfish

Concern: Protect Drinking Water Designated Uses

Although levels of nitrate in finished drinking water remain consistently below the Maximum Contaminant Level allowed under the Drinking Water Quality Standards, stream monitoring data indicate that rising levels of nitrate may be an issue in some surface water supplies. Nitrate above the drinking water MCL has adverse health effects and is difficult and expensive to remove from drinking water. It is important to note that drinking water MCLs for nitrate were met in public water supplies.

Recommendations:

- Continue to monitor and evaluate levels of nitrate in finished drinking water
- Identify sources and management strategies at affected intakes